LuK Repair Solution for Clutch Modules

Technology
Special Tool / Removal and Installation

Single-plate clutch module
6-speed gearbox, 0B1, 0B2, 0B3 from Audi A4, A5, Q5 and A6

Multi-plate clutch module
6-speed gearbox, 0B4 from Audi A4 and A5

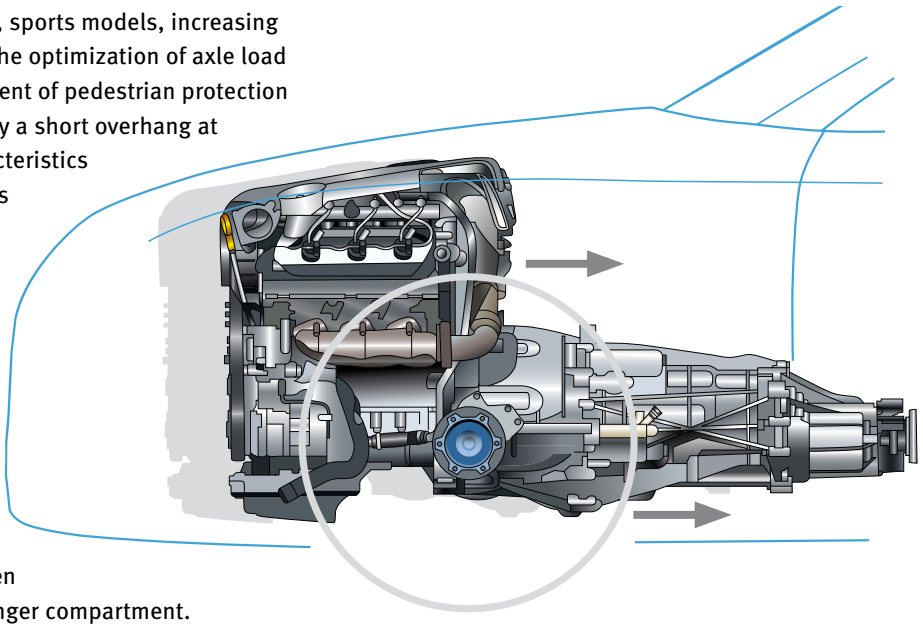
SCHAEFFLER
AUTOMOTIVE AFTERMARKET

LuK INA FAG

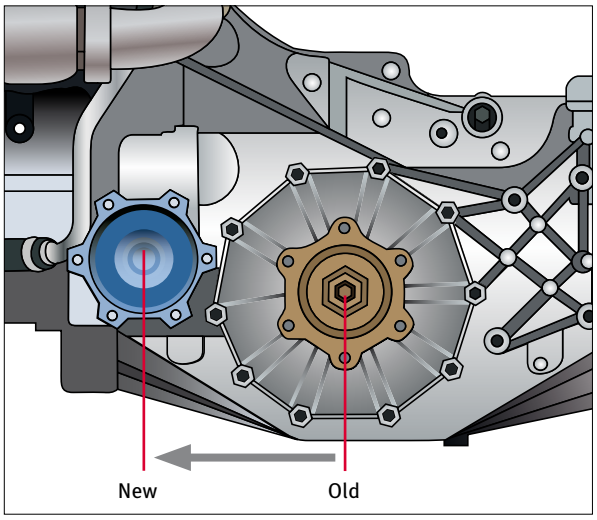
Contents

1 Clutch Module – the solution for compact drive units

In the development of new, sports models, increasing attention is being paid to the optimization of axle load distribution, the improvement of pedestrian protection and seeking to achieve only a short overhang at the front. Additional characteristics such as good aerodynamics and more precise handling round off a successful vehicle concept. To make it possible to fit modern transmission units into the new long wheel-base bodywork forms, the position of the powertrain has been changed. Engine and gearbox have both been moved closer to the passenger compartment.

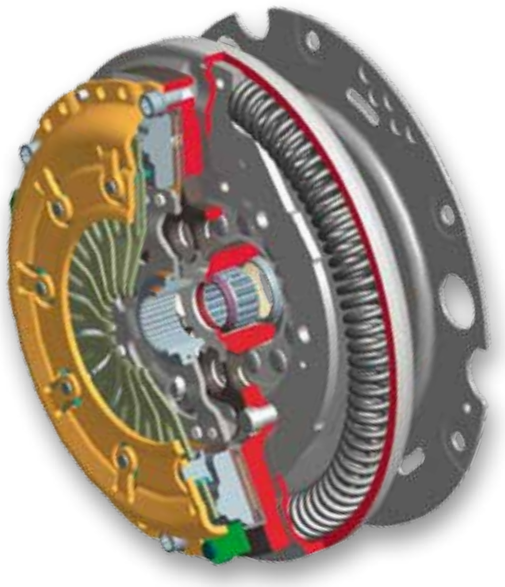


If the existing gearbox generation had been used, this would have led to an unfavorable relocation of the stub axles and a resulting reduction of the wheel-base. The only way to avoid this drawback was by redesigning the gearbox. In the new design, the differential is located on the side of the gearbox. In this way, the original position of the stub axles have been restored.



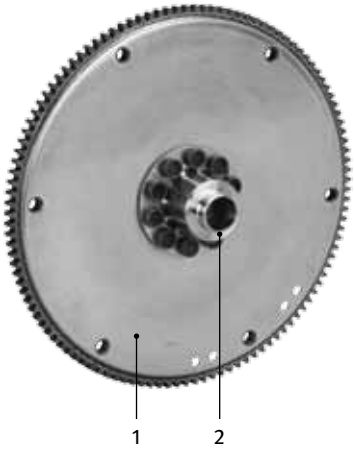
In this gearbox design, the front stub axle shaft passes through the transmission bell housing in front of the clutch. The use of a conventional combination of clutch and Dual Mass Flywheel (DMF) is therefore no longer possible.

Due to the special design characteristic of the transmission, it has been necessary to develop a special clutch module. This combines proven clutch components and a DMF with a special clutch transmission drive plate. This innovative technology makes it possible to fit all the components into the transmission's bell housing in spite of the space now being taken up by the stub shaft.

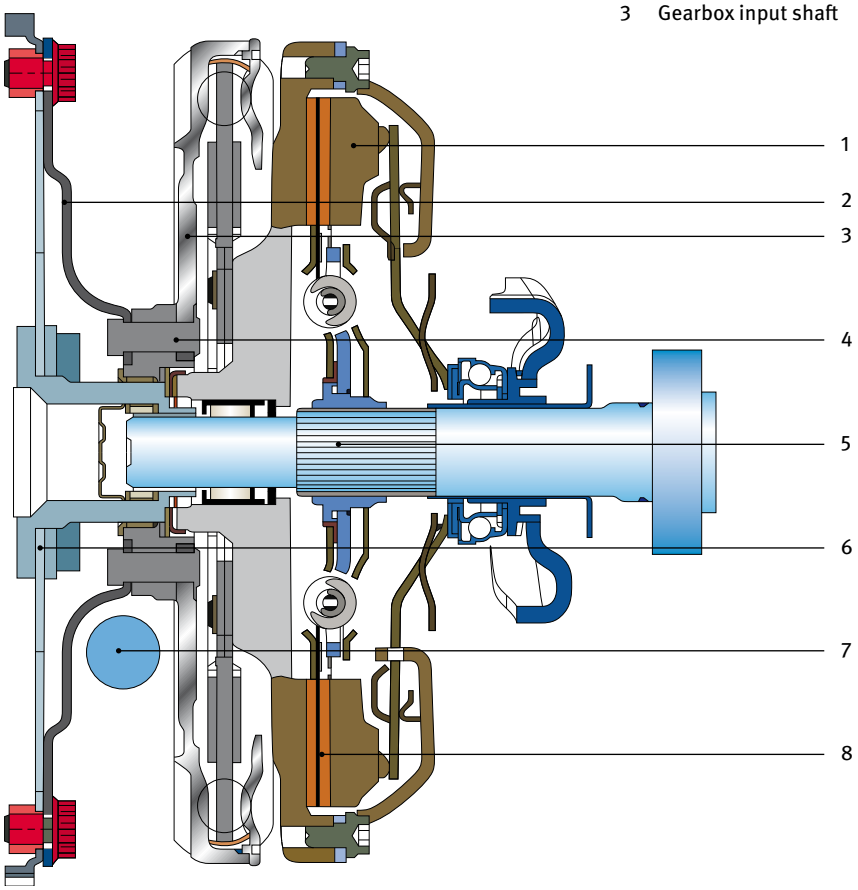


2 Single-plate clutch module

The single-plate clutch module consists of a Dual Mass Flywheel (DMF) and a diaphragm spring clutch with keyhole tabs or a Self-Adjusting Clutch (SAC). In order to create the space needed for the stub axle shaft to pass through, a drive plate is permanently joined to the DMF by a riveted joint on the crankshaft bolt holes. The clutch module is attached to the engine drive plate via the outer flange of the transmission drive plate. As a result, the repair procedure for replacement of components has been changed. Before the gearbox is removed, the clutch module must be separated by disconnecting the engine drive plate from the transmission drive plate. This procedure is similar to the separation of the torque converter from the drive plate during the removal of an automatic gearbox. After removal of the gearbox, the clutch module remains inside the bell housing, like the converter in an automatic gearbox. The left stub axle shaft prevents the module from falling out during removal of the gearbox.



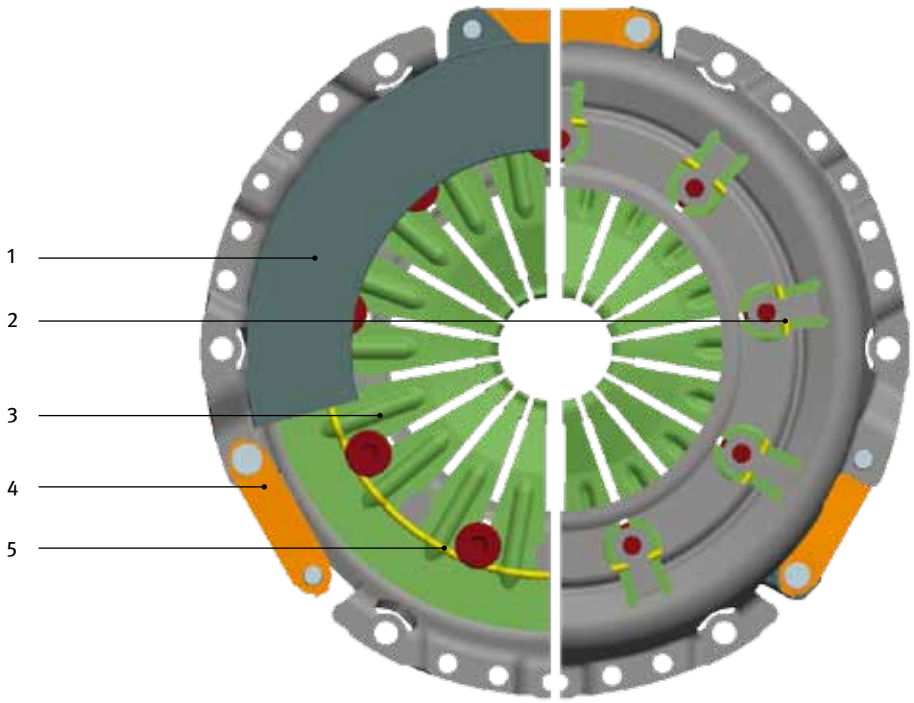
1 Engine drive plate
2 Drive plate centering hub with pilot bearing
3 Gearbox input shaft
4 Differential
5 Clutch module
6 Stub axle shaft, left



1 Pressure plate
2 Transmission plate (drive plate)
3 Dual Mass Flywheel
4 Riveted joint
5 Gearbox input shaft
6 Engine drive plate
7 Stub axle shaft, left
8 Clutch disc

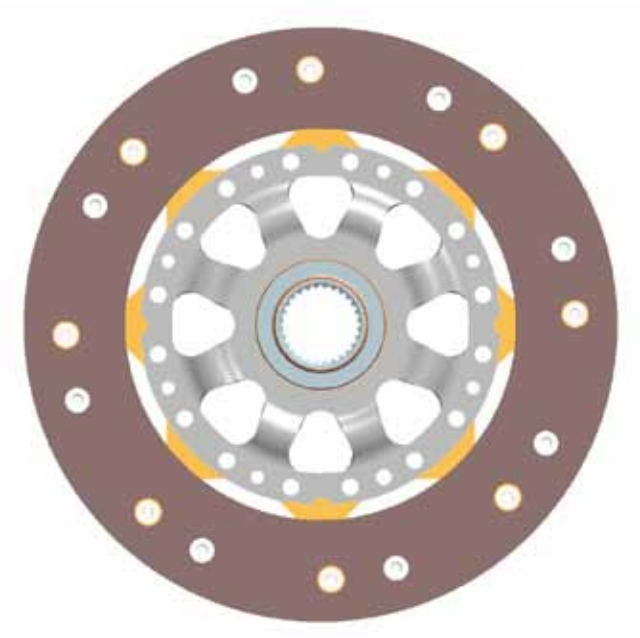
2.1 Design of diaphragm spring clutch with keyhole tabs

The diaphragm spring clutch with keyhole tabs is a further development of the conventional clutch. It is only used for the smallest engine sizes. The keyhole tabs are integral parts of the clutch cover and are so designed that they pull the studs outwards. As a result, the diaphragm spring never suffers from play in spite of wear. The advantage of this design is that the release remains consistent throughout its service life.



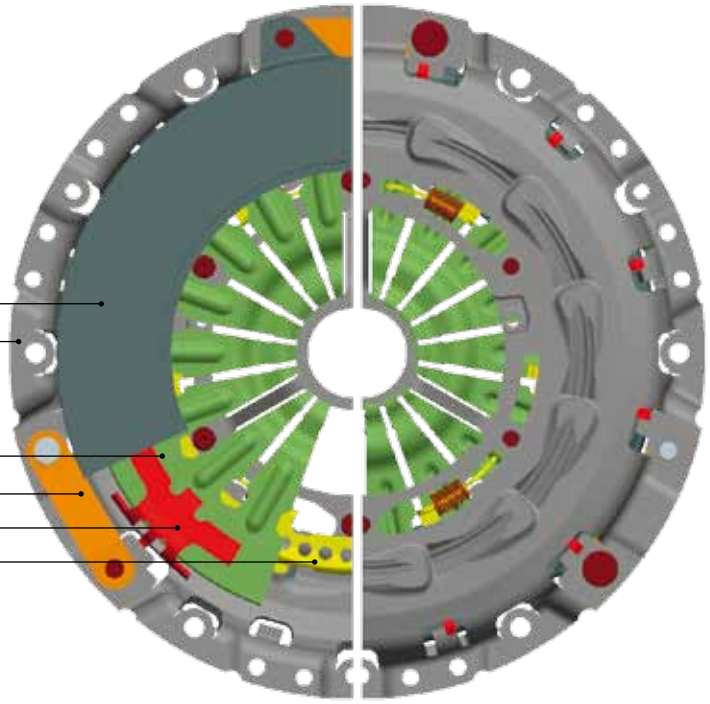
1 Pressure plate
2 Keyhole tab with rivet
3 Disc spring
4 Tangential leaf spring
5 Tilting ring

Rigid clutch disc



2.2 Design of Self-Adjusting Clutch (SAC)

As opposed to a keyhole tab clutch, a single-plate SAC can transmit higher engine torque within the same dimensions. Another advantage is the low disengaging force, which remains practically constant throughout the service life. Because of these characteristics, this design is used for high-capacity petrol and diesel engines.



1 Pressure plate
2 Clutch housing
3 Diaphragm spring
4 Tangential leaf spring
5 Sensor diaphragm spring
6 Adjusting ring

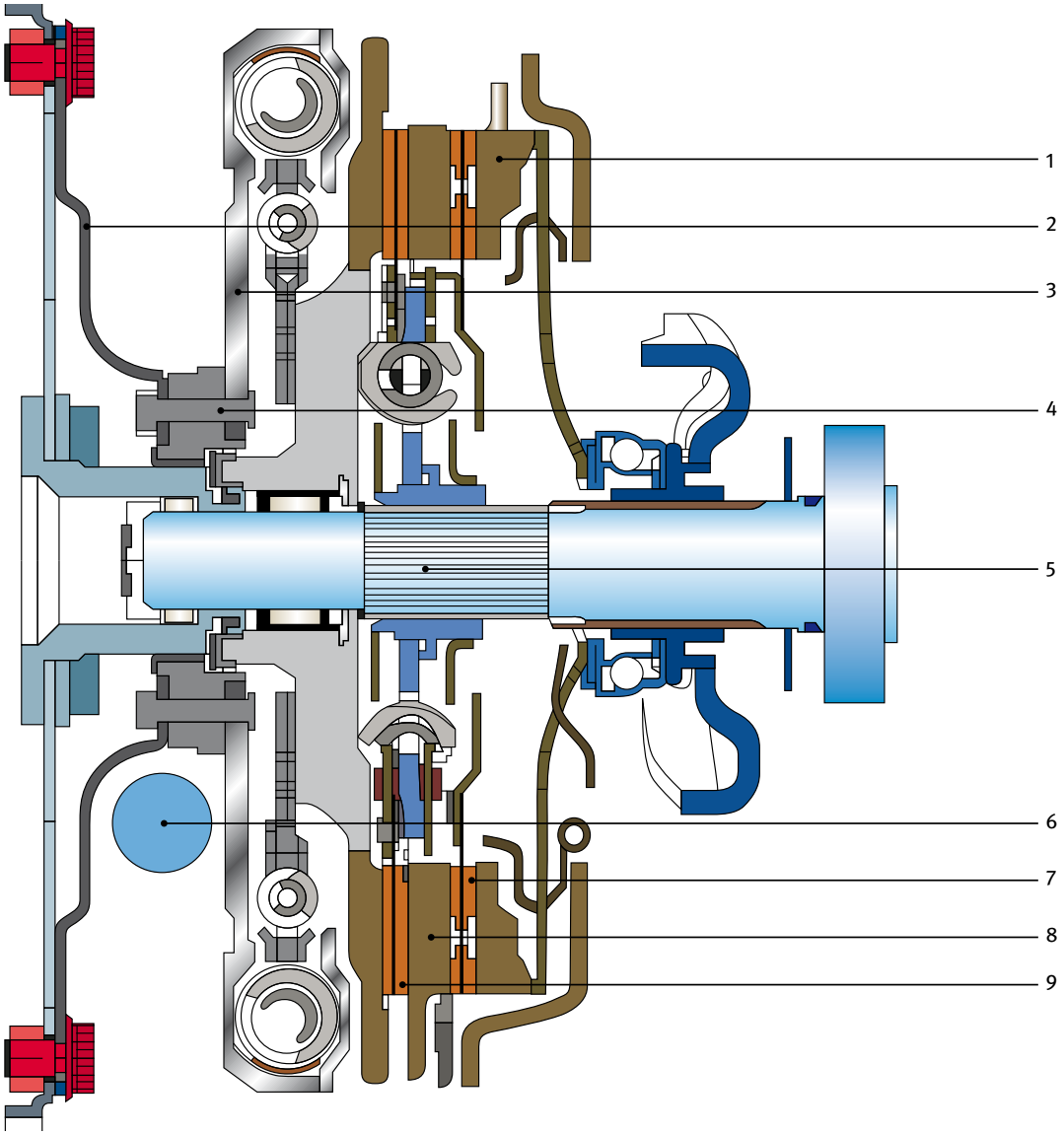
Clutch disc with torsional dampers

Note:
A SAC should always be fitted without any application of a counteracting force. Installation without the application of a counteracting force is achieved using LuK special tool 400 0237 10.

Detailed information on self-adjusting clutches can be found in the technical brochure: „Self-Adjusting Clutch (SAC)“ or at www.schaeffler-aftermarket.com and www.RepXpert.com.

3 Multi-plate clutch module

The multi-plate clutch module consists of a multi-plate SAC and a DMF with transmission drive plate. The main difference from the single-plate design is the addition of an intermediate pressure plate with three further tangential leaf spring assemblies to ensure consistency of release and an additional clutch disc. The advantage of this variant is the possibility of reducing the release forces or of increasing the transmissible engine torque with constant release force. In comparison with the single-plate clutch module, the DMF in this design has an additional internal damper. In combination with the torsional dampers on the clutch disc, this leads to the maximum possible vibration damping across all speed ranges.

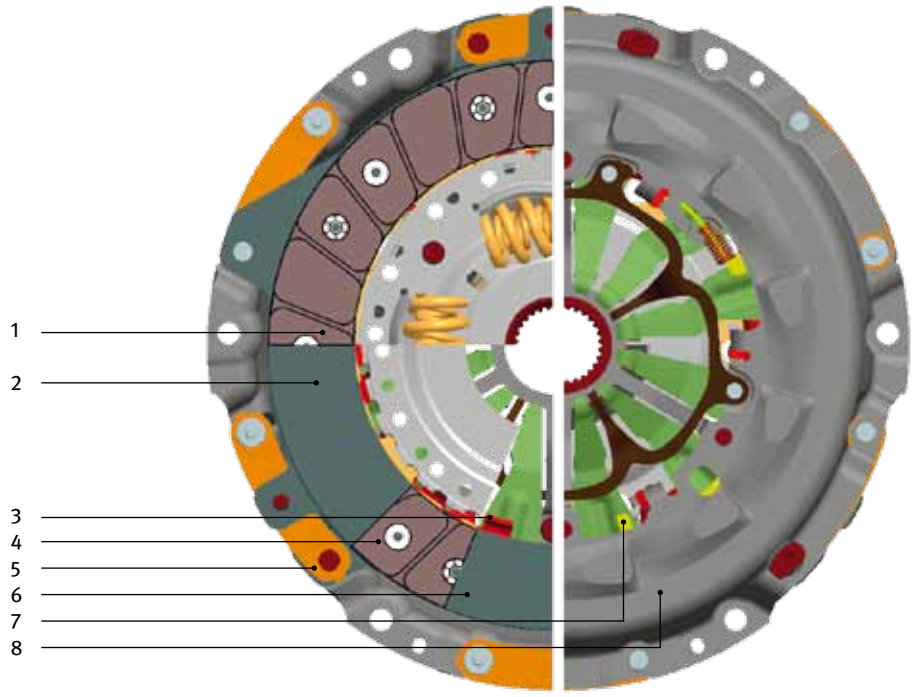


1 Pressure plate
2 Transmission plate (drive plate)
3 Dual Mass Flywheel
4 Riveted joint
5 Gearbox input shaft
6 Stub axle shaft, left
7 Clutch disc 1
8 Intermediate pressure plate
9 Clutch disc 2

3.1 Design of multi-plate SAC

The pressure plate and the adjusting mechanism are the same as in the single-plate design. In addition to clutch disc 1, which is connected by a toothed drive with meshing teeth on clutch disc 2, two further friction surfaces are provided by means of an intermediate plate.

This provides for transmission of the high engine torque of the 3.0 TDI engine. The torsional damping and torque transmission to the gearbox input shaft are undertaken by clutch disc 2.



1 Clutch disc 2
2 Intermediate pressure plate
3 Sensor diaphragm spring
4 Clutch disc 1
5 Tangential leaf spring
6 Pressure plate
7 Adjusting ring
8 Clutch housing

Clutch disc 2 with torsional damper

1 Meshing teeth

Note:
A SAC should always be fitted without any application of a counteracting force. Installation without the application of a counteracting force is achieved using LuK special tool 400 0237 10.

Detailed information on self-adjusting clutches can be found in the technical brochure: „Self-Adjusting Clutch (SAC)“ or at www.schaeffler-aftermarket.com and www.RepXpert.com.

4 Design of DMF with transmission plate (drive plate)

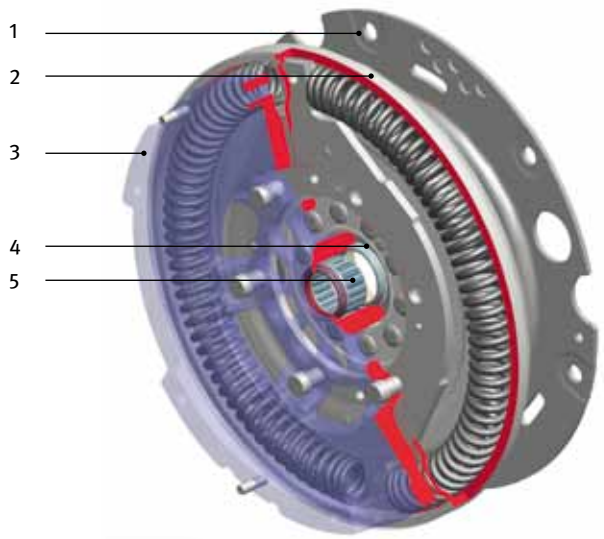
The previously familiar design of the DMF has been modified in two ways for use in the clutch module.

Torque transmission
The engine torque is transmitted to the DMF via a transmission plate, called a drive plate.

Bearings
The primary flywheel runs on a center bearing on the drive plate and the secondary flywheel has a needle bearing on the gearbox input shaft.

DMF for single-plate clutch module

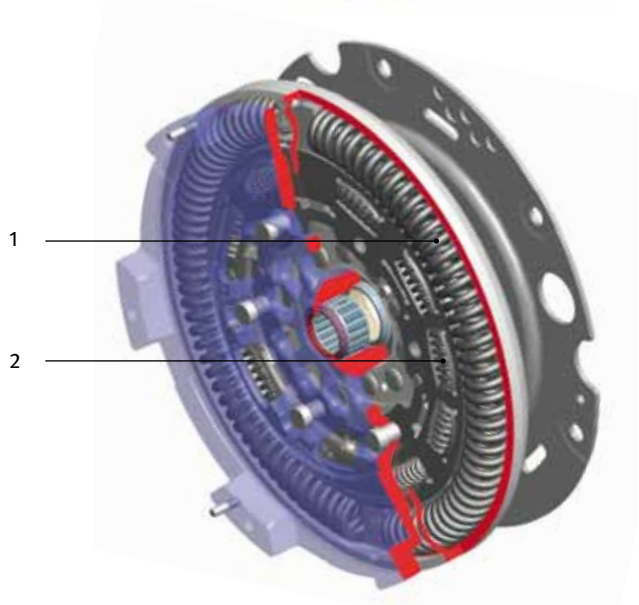
1 Transmission plate (drive plate)
2 Primary flywheel
3 Secondary flywheel
4 Center bearing
5 Needle bearing for secondary flywheel



DMF for multi-plate clutch module

The DMF in the multi-plate clutch module differs from that in the single-plate version due to its modified internal design. The transmission of higher engine torques made a modification of the vibration damping necessary. Torsional vibrations are absorbed by arc springs with internal springs in the spring channel and pressure springs with internal springs in the flange.

1 Arc spring with internal spring/internal damper
2 Pressure spring with internal spring/ internal damper



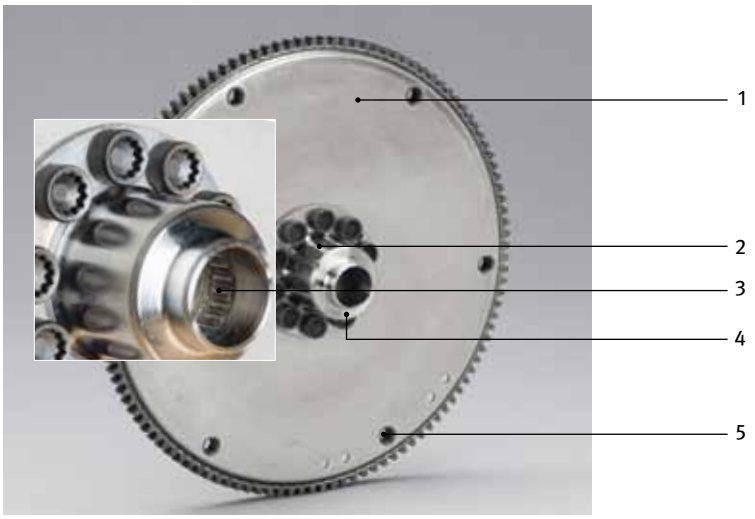
Caution:
Because of the arrangement and shape of the DMF, it is not possible to measure wear using LuK special tool 400 0080 10!

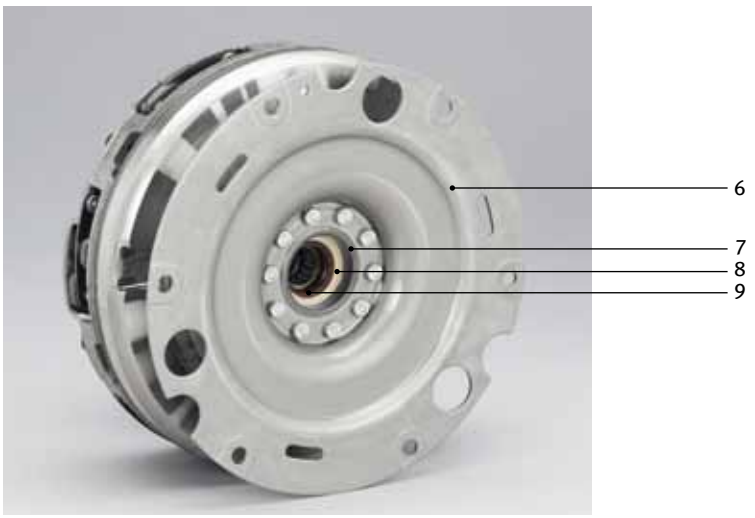
Detailed information on dual mass flywheels can be found in the technical brochure: „Dual Mass Flywheel - DMF“ or at www.schaeffler-aftermarket.com and www.RepXpert.com.

5 Bearings and centering of clutch module

In order to avoid undesirable engine vibration, the design has been modified to allow precise alignment of the DMF during installation. A conventional DMF is axially aligned with the crankshaft by means of a hub before assembly of the gearbox. Radial alignment is ensured, after alignment of the DMF and crankshaft holes, by fastening bolts.

As a result of the modified design, correct alignment of the clutch module with the drive plate cannot take place until the installation of the gearbox or later. Axial alignment is made possible by a centering hub with a support bearing. The centering hub is permanently connected with the drive plate and is bolted to the crankshaft. In addition, the internally mounted pilot bearing ensures the centering of the gearbox input shaft. During the installation of the gearbox, the centering hub is inserted into the center bearing of the DMF until it touches the support bearing. At the same time, the shaft sealing ring which seals the bearings on the DMF side is in the correct position in relation to the running surface of the centering hub. The axial positioning now provides the basis for the radial alignment, which is carried out by means of the index bore in the drive plate.



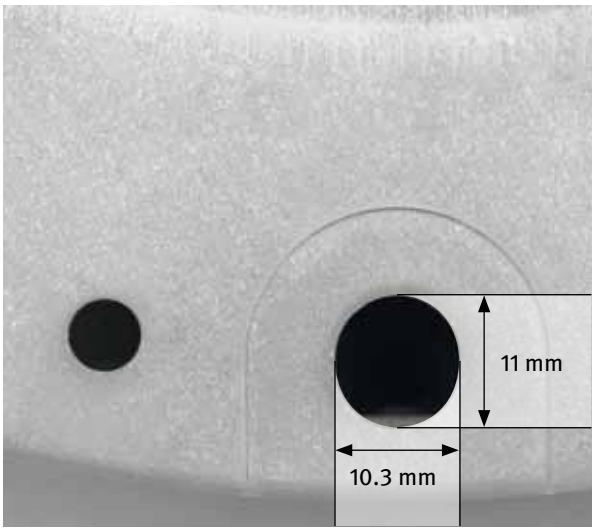


1 Engine drive plate
2 Centering hub
3 Pilot bearing
4 Running surface of radial shaft seal ring
5 Threaded bore for attachment of drive plate
6 Transmission plate (drive plate)
7 Centering bearing
8 Support bearing
9 Radial shaft seal ring

6 Function of the index bore in the transmission plate (drive plate)

The transmission drive plate of the DMF has six holes in its outer flange. By means of these holes, it is fastened to the engine drive plate at the factory by means of three or six bolts according to the number of cylinders in the engine. Five of these holes have the same diameter of 11 mm. One bore measures 10.3 x 11 mm. This serves as an index hole for the radial alignment of the transmission drive plate with the engine drive plate. The index bore is always located immediately next to the control bore used for fitting the special tool. The combination of holes makes identification of the index bore much easier.

When the gearbox has been fitted, the transmission drive plate is bolted finger-tight (2 Nm) to the engine drive plate with the first bolt, using the index bore. All the other threads in the engine drive plate are then exactly aligned with the holes in the transmission drive plate. The crankshaft is now rotated in steps (120° for 4-cylinder engines, 60° for 6 and 8-cylinder engines. In this way, all the other bolts can be fitted finger-tight through the service aperture. This prevents distortion when attaching the transmission drive plate to the engine drive plate. In a second rotation of the crankshaft, the bolts are secured to their final tightening torque of 60 Nm.



1 Index hole
2 Control hole

7 Description of special tools

In order to avoid functional and assembly problems, the clutch modules must be exactly positioned before the gearbox is fitted. These preparatory steps are only made possible by using the appropriate special tools.

Special tool 1 has the following functions:

- Radial support of the module for guidance on to the center bearing (centering hub) without jamming during assembly
- Fixing of the index bore via the service aperture
- Radial support of the clutch module during transport of the gearbox

Special tool 2 has the following function:

- Axial support of the clutch module during fitting of the gearbox - the clutch module is pressed on to the centering hub
- Axial securing of the clutch module during transport of the gearbox

Special tool 3 (hand grip) has the following functions:

- Safer fitting, removal and transport of the clutch module

8 LuK Special Tool – description and contents

Using a special tool is an absolute must to ensure correct installation of the Self-Adjusting Clutch (SAC). No counteracting forces must be applied during installation to prevent early rotation of the adjusting ring in the clutch pressure plate.

For any questions concerning the SAC or the correct use of the special tool (Part # 400 0237 10) call us on: +49 (0) 1801 753-333.

Tool case contents

1 Six different tapered bushings to spread both white tensioning/centring elements (15-28 mm) to support the clutch disc
2 Universal centring pin with guide and tensioning element
3 Three screw-on centring pins of varying diameter (12 mm, 14 mm, and 15 mm) for pilot bearing
4 Pressure piece and spindle carrier with 3- and 4-hole pitch
5 Centring sleeve (BMW)
6 Four studs M6, M7 and M8
7 Four knurled nuts
8 Thread closing cover to protect the inner thread
9 Two tensioning/centring elements (12-28 mm) to fit pilot bearing and crankshaft bore
10 Four special centring pins (BMW) of varying diameter and corresponding screw
11 Face spanner/releasing tool for pre-tensioned clutches (Audi, Seat, Skoda and VW)

It is essential to centre the clutch disc to ensure that the gearbox is correctly mounted and that the clutch works properly. Correct centring of the clutch disc also allows the primary shaft to be positioned in the clutch disc hub smoothly, which minimises the risk of clutch disc or hub profile damage.

We offer a universal centring pin with add-on components developed to fit virtually every vehicle make and model. There is a wide variety of assembly options to suit individual repair needs.

Universal centring pin – assembly options

Basically, the universal centring pin can be used on every type of vehicle. Normally, a pilot bearing is installed in the crankshaft bore. The bearing's inner diameter is smaller than that of the hub. What makes the universal pin special is its ability to be used even on applications without a pilot bearing, where the inner diameter of the crankshaft bore can be bigger than that of the hub.

Correct assembly of the centring pin is dependent on the inner diameter of the pilot bearing or crankshaft bore, and on the distance between the pilot bearing or crankshaft bore and the clutch disc's hub profile.

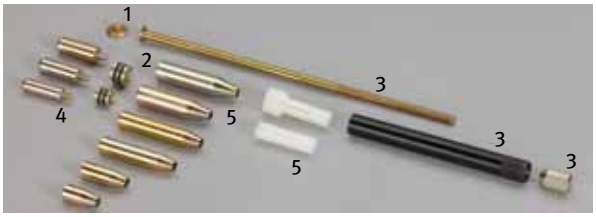
There are consequently two types of centring pin adapters:

- To fit pilot bearings with an inner diameter of 12 mm, 14 mm or 15 mm use the corresponding screw-on centring pins.
- To fit all other applications use the variable tensioning/centring components with diameters ranging from 12-28 mm.

Individual components can be combined freely to suit specific centring pin requirements. However, be sure to assemble the components in the following order:

The graphic shows the order in which components need to be assembled. If none of the three screw-on centring pins are used, screw on the closing cover to protect the thread from dirt and impact.

Assemble the universal centring pin according to the specific requirements and insert into the crankshaft bore through the clutch disc hub. Ensure that the tensioning/centring elements are level with the crankshaft guide and the clutch disc hub. Tightening the tensioning element positioned at the tip of the centring pin spreads the individual components, thereby centring the disc.



1 Thread closing cover to protect thread from dirt ingress
2 Two tensioning/centring elements (12-15 mm and 15-28 mm) for pilot bearing or crankshaft bore
3 Universal centring pin with guide and tensioning element pilot bearing and crankshaft bore
4 Three screw-on centring pins of varying diameter to fit pilot bearing
5 Spreading of the white tensioning/centring elements (15-28 mm) to receive the clutch disc

9 Special LuK Repair Solutions for Clutch Modules

LuK RepSet® with single-plate keyhole tab clutch
Contents:
- Pressure plate
- Clutch disc
- Release bearing
- Centering sleeve
- 6 fastening bolts for pressure plate
- 3 fastening bolts for transmission drive plate
- 2 special tools (axial and radial support)
- 1 handle for installation and removal of module

Note:
A suitable alignment tool must be used for assembly of the clutch.

LuK RepSet® with single-plate SAC
Contents:
- Pressure plate
- Clutch disc
- Release bearing
- Centering sleeve
- 6 fastening bolts for pressure plate
- 6 fastening bolts for transmission drive plate
- 2 special tools (axial and radial support)
- 1 hand grip for installation and removal of module

Note:
LuK special tool 400 0237 10 is needed for assembly of SAC.

LuK RepSet® with multi-plate SAC
Contents:
- Pressure plate (with pre-assembled clutch disc 1)
- Clutch disc 2
- Release bearing
- Centering sleeve
- 6 fastening bolts for pressure plate
- 6 fastening bolts for transmission drive plate
- 2 special tools (axial and radial support)
- 1 handle for installation and removal of module

Note:
LuK special tool 400 0237 10 is needed for assembly of SAC.

LuK DMF

Contents:

- DMF
- 6 fastening bolts for pressure plate
- 3 or 6 fastening bolts for transmission drive plate
- 2 special tools (axial and radial support)
- 1 hand grip for installation and removal of module

Note:
LuK special tool 400 0237 10 is needed for assembly of DMF.

LuK RepSet® DMF

Contents:

- DMF
- Pressure plate with self-adjustment or keyhole tab
- Clutch disc/s
- Centering sleeve
- Release bearing
- 6 fastening bolts for pressure plate
- 3 or 6 fastening bolts for transmission drive plate
- 2 special tools (axial and radial support)
- 1 handle for installation and removal of module

Note:
LuK special tool 400 0237 10 is needed for assembly of SAC.

10 Assembly and disassembly of clutch module with single-plate SAC

10.1 LuK Repair Solution for Clutch Modules – training DVD

The training video “LuK Repair Solution for Clutch Modules” gives step-by-step instructions on the removal and assembly procedures of the clutch module, as well as assembly and disassembly of the clutch itself.

The video film is available as Part # 999 6003 560.

In addition, the training video is available for download at www.RepXpert.com or at www.schaeffler-aftermarket.com.

10.2 General repair information

- Repairs should only be carried out by specialist personnel with suitable workshop equipment.
- As a result of the continual technical developments made to the range by the vehicle manufacturer, changes may be made to the repair procedure or in the special tools required.
- Repairs must always be carried out using the latest repair instructions and the correct special tools.

You can find up-to-date data and more information at:
www.schaeffler-aftermarket.com or at
WWW.REPXPERT.COM

- When replacing the clutch, the Dual Mass Flywheel (DMF) should also be inspected and, if necessary, replaced.
- When replacing the clutch and/or the DMF, the pilot bearing in the engine drive plate should also be inspected and, if necessary, replaced.
- When the gearbox has been dismantled, the DMF bearing point on the gearbox input should be inspected for wear and, in the case of damage, the input shaft should be replaced.
- Each LuK RepSet® or LuK DMF must always be fitted exclusively with the components from the package. A combination of used and new parts is not permissible.
- Oily and/or dirty gearbox parts should be cleaned before the new components are fitted. Attention should be paid to cleanliness throughout the repair.

Caution:
The clutch module must on no account be dropped. Mechanical shocks must always be avoided, as they have an adverse effect on the adjusting mechanism of the SAC!

Clutch module, gearbox side

Clutch module, engine side

10.3 Removal of clutch module

Note:
Assembly and disassembly of the single-plate SAC is described in the following user instructions. Different repair procedures for self-adjusting multi-plate and self-adjusting keyhole tab clutches are described in sections 11 and 12.

- Remove service flap on gearbox

- Remove bolts from transmission drive plate

Note:
In the case of 4-cylinder engines, remove 3 bolts.
In the case of 6 and 8-cylinder engines, remove 6 bolts.

Caution:
Remove the gearbox in accordance with the vehicle manufacturer's instructions!
The gear linkage and the electrical plug connection to the gear recognition switch must be separated from the gearbox with suitable tools!

- In order to avoid leakage of oil, the gearbox should be tilted toward the differential and slightly to the rear
- Remove the stub shaft fastening bolts

- In order to avoid damage to the radial shaft seal on the gearbox side, the stub axle shaft should be supported by a free hand reaching through the service aperture during dismantling

Caution:
If this precaution is not taken, the splines of the stub shaft may hit the radial shaft seal on the gearbox side and damage it during dismantling!

10.3 Removal of clutch module

- Attach special tool 3 (handle) to transmission drive plate

- Remove the clutch module from the gearbox

Caution:
The clutch module weighs up to 22 kg. Incorrect removal may lead to an increased risk of accidents. A suitable storage area must be prepared in the immediate vicinity in advance.

- Inspect the radial shaft oil seal and needle bearing of the DMF
- In the case of damage, the DMF must be replaced

10.4 Preparatory measures

- Clean the gearbox input shaft and inspect for wear
- The shouldered shaft end (spigot) must be in perfect condition

- Clean and inspect the radial shaft oil seal in the gearbox housing and apply suitable lubricant

Note:
Always use the grease recommended by the vehicle manufacturer for radial shaft oil seal.

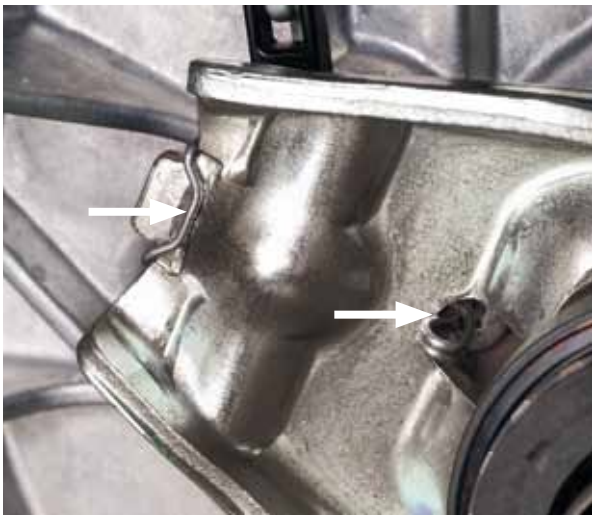
- Remove the release clip together with the release bearing
- Inspect the ball pivot, retaining spring and adapter and replace if necessary
- Apply a lubricant approved by the vehicle manufacturer to the ball pivot

10.4 Preparatory measures

- Remove centering sleeve
- Inspect the radial shaft seal ring on the gearbox input shaft
- Fit new centering sleeve
- Apply locking agent to the fastening bolts of the centering sleeve
- Tighten the fastening bolts with a torque of 8 Nm

Note:
First generation centering sleeves may be secured with a retainer plate. This is no longer used when the new centering sleeve is fitted.

- Fit the release clip over a new release bearing
- Ensure that the retainer spring is correctly seated



- Apply lubricant to the splines of the gearbox input shaft

Note:
Use LuK highperformance grease, Part # 414 0014 10.

- Apply lubricant to the new clutch disc

Note:
Use LuK LuK highperformance grease Part # 414 0014 10.

- Slide the clutch disc axially on the gearbox input shaft several times
- Remove the clutch disc, rotate it, and fit it again.
- Repeat this procedure
- After removal of the clutch disc, remove surplus lubricant from the splines

10.5 Disassembly of SAC

- Place the clutch module together with the transmission drive plate on a flat surface
- Remove the old pressure plate and clutch disc

- Check and clean the friction surface of the DMF
- Put together the alignment tool from elements of the LuK special tool set as shown

1 Tensioning/centering element for the spigot bearing
2 End stop
3 Conical sleeve No. 2, 15 x 40 mm
4 Clutch disc tensioning/centering element

10.6 Assembly of SAC

- Place the clutch disc on the DMF

- Pay attention to the correct orientation of the clutch disc
- The word “Getriebeseite” (gearbox side) must be visible

- Center the clutch disc

Note:
When the alignment tool is being tightened, the tensioning/centering element for the spigot bearing must be exactly positioned in the bearing of the DMF. The correct position can be checked from the transmission plate side.

10.6 Assembly of SAC

- Fit the pressure plate

- Pay attention to the correct fitting position of the pressure plate
- When correctly fitted, all the centering dowels on the DMF are located in the corresponding holes in the pressure plate housing

- Screw in the 3 studs of the LuK special tool at 120° intervals

- Place the spindle carrier with the pressure piece onto the clutch
- Screw on the 3 knurled nuts until they are flush with the studs

- Pre-tension the clutch diaphragm spring by screwing in the spindle

- Stop the procedure as soon as the pressure plate housing touches on the DMF

10.6 Assembly of SAC

- Screw in pressure plate bolts finger-tight

- Remove spindle carrier with pressure piece and centering pin
- Fit the remaining pressure plate bolts
- Tighten all pressure plate bolts with a torque of 22 Nm plus 90°

10.7 Fitting clutch module into gearbox

- Attach special tool 3 (handle) to the transmission drive plate

- Fit the clutch module into the gearbox

- Turn the transmission drive plate until the stub axle shaft hole is visible

- In order to avoid damage to the radial shaft oil seal on the gearbox side, the stub axle shaft should be supported by a free hand reaching through the service aperture

- The stub axle shaft can now be fitted centrally in the gearbox hole

10.7 Fitting clutch module into gearbox

Caution:
If the stub axle shaft is not manually guided during the assembly, the gear may collide with the radial shaft oil seal and damage it. This results in the loss of gearbox oil which may lead to the premature failure of the clutch.

- Fit the stub axle shaft fastening bolts and tighten with a torque of 24 Nm

- Turn the transmission plate (drive plate) until the index and control hole is above the service aperture of the gearbox

- Fit special tool 1 for radial support of the clutch module

- Clip special tool 2 onto the stub axle shaft for axial support of the clutch module

- Correct fitting position of special tool 2 (shown as an example without the transmission drive plate)

10.8 Notes on engine drive plate

- Before installation of the gearbox, the starter ring gear, the pilot bearing and the centering hub of the engine drive plate should be inspected

- A defective pilot bearing may be replaced individually

- For replacement of the pilot bearing, the drive plate must be separated from the engine

10.9 Notes on installation of gearbox

Caution:
Install the gearbox in accordance with the instructions of the vehicle manufacturer!

- Attach the clutch module to the engine drive plate with the first bolt, finger-tight

- Remove special tool 2

10.9 Notes on installation of gearbox

- Remove special tool 1

- Turn the engine and tighten all bolts in sequence by hand

Note:
In the case of 4-cylinder engines, fit 3 bolts. In the case of 6 and 8-cylinder engines, fit 6 bolts.

- Tighten all bolts with a torque of 60 Nm

- Close the service aperture flap on the gearbox

11 Assembly of clutch module with multi-plate SAC

- Lay the clutch disc on the pressure plate
- Make sure that the gear teeth on both clutch disc hubs are engaged

- Fit the pressure plate, together with the clutch discs, on the DMF
- All the following steps in the procedure are identical with those for assembly of the single-plate SAC

12 Assembly and disassembly of clutch module with single-plate keyhole tab clutch

- No special tool is required to dismantle the single-plate keyhole tab clutch
- For assembly, a suitable alignment tool should be used
- Fitting and removal of the assembled clutch module is identical for all designs

	LuK	●	●	●	●	●
	LuK	●	●			
	LuK	●	●	●	●	
	INA	●	●	●	●	
	INA	●	●	●	●	
	INA	●	●			
	FAG	●	●	●	●	

Phone: +49 (0) 1801 753-333
Fax: +49 (0) 6103 753-297
automotive-aftermarket@schaeffler.com
www.schaeffler-aftermarket.com